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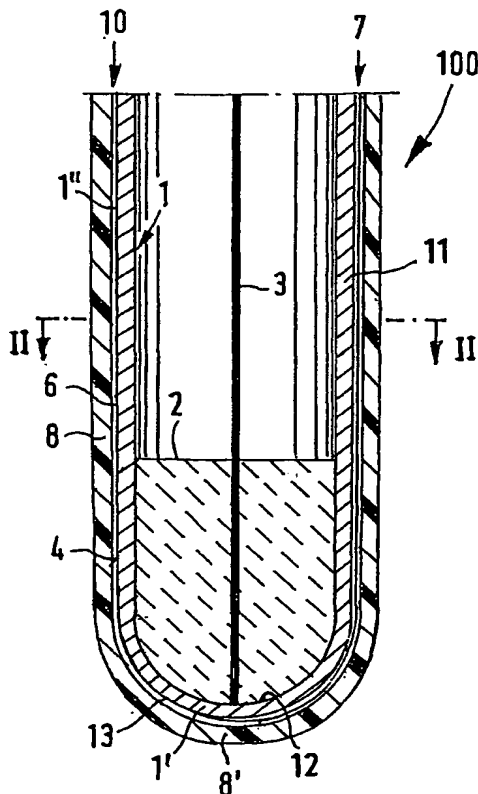
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(54) Title: PROBE FOR DETERMINATION OF OXYGEN ACTIVITY IN METAL MELTS AND METHODS FOR ITS PRO-
DUCTION



(57) Abstract: The invention relates to a probe (100, 200, 300, 400, 500, 600) for the measurement of the oxygen activity of metal melts, in particular steel melts, comprising a reference substance (2) of known oxygen activity in electrically conducting contact (3) with a measuring device; and comprising a solid electrolyte predominantly oxygen ion conducting and negligibly electron conducting at high temperatures and separating the reference substance (2) from the metal melt and having an entry surface (4) for oxygen ions which is in contact with the metal melt, wherein the entry surface (4) of the probe ready for operation is covered by a functional foil arrangement (10, 20) in close contact to the entry surface (4).

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INTERNATIONAL SEARCH REPORT

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 IPC 7 G01N27/411 G01N33/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 1 594 223 A (NAT RES DEV)	1-3, 7-11
A	30 July 1981 (1981-07-30)	
	page 1-2; figure 1	4-6
Y	---	
	DATABASE WPI	1-3, 7-11
	Section Ch, Week 198139	
	Derwent Publications Ltd., London, GB;	
	Class J04, AN 1981-70709D	
	XP002271695	
	-& JP 56 100353 A (HITACHI CHEM CO LTD),	
	12 August 1981 (1981-08-12)	
A	abstract; figures 1-3	4-6

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Section Ch, Week 198523 Derwent Publications Ltd., London, GB; Class J03, AN 1985-139795 XP002271696 -& SU 1 124 219 A (TSNIITMASH MECH ENG), 15 November 1984 (1984-11-15) abstract; figure 1</p>	1
A	<p>US 4 657 641 A (ICHISE EIJI ET AL) 14 April 1987 (1987-04-14) the whole document</p>	1-19
A	<p>US 3 752 753 A (FITTERER G) 14 August 1973 (1973-08-14) cited in the application the whole document</p>	1-19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/13012

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 1594223	A	30-07-1981	CA 1099785 A1 DE 2802518 A1 JP 53106091 A	21-04-1981 27-07-1978 14-09-1978
JP 56100353	A	12-08-1981	NONE	
SU 1124219	A	15-11-1984	SU 1124219 A1	15-11-1984
US 4657641	A	14-04-1987	JP 61260156 A CA 1243350 A1 DE 3680038 D1 EP 0208072 A1 US 4708783 A	18-11-1986 18-10-1988 08-08-1991 14-01-1987 24-11-1987
US 3752753	A	14-08-1973	NONE	